

The critical role of funders in shrinking the carbon footprint of research



Climate change is here and we are feeling its consequences for water, food security, ecosystems, and human health.¹ Research funders are increasingly supporting projects on climate change and climate action. However, many academic practices have a large carbon footprint and thereby contribute to the very problems that scientists are trying to solve. According to the Intergovernmental Panel on Climate Change (IPCC), all sectors must rapidly decarbonise if we are to limit global warming to 1.5°C;¹ the research sector included.

There is a growing appetite for sustainable approaches in academia, from decarbonising conferences,² to pledges to fly less,³ and green laboratory initiatives such as My Green Lab and the Laboratory Efficiency Assessment Framework (LEAF).⁴ However, little attention has been paid to the role academic funders have in shaping sustainable research practices. In terms of the overall carbon footprint of research, international flights are often the greatest single source of carbon emissions of research activities.⁵ We examined the research budgets for 43 research projects, funded through the EU Horizon 2020 programme, the European Research Council (ERC), European and Developing Countries Clinical Trials Partnership (EDCTP), and the Bill & Melinda Gates Foundation as an indication of current practices. These projects had a total budget of €419.1 million, of which €12.7 million was allocated to travel and project meetings. After excluding indirect costs (overheads) and salaries, a median of 13.2% (IQR 6.5–38.8) of direct costs were allocated to travel and project meetings. Although international meetings are important for collaboration and travel is sometimes unavoidable for data collection, the COVID-19 pandemic has shown the value of virtual interaction.² Compared to in-person meetings, virtual meetings are cheaper, have a 1000–3000-fold lower carbon footprint,⁵ require no travel time, and are more inclusive by allowing individuals with workplace or domestic commitments or other travel restrictions to participate.^{2,5} Given the digital shift that has occurred during the pandemic and the escalating climate crisis, now is the time to embed sustainable practices into our research culture. We argue that funders are in a powerful position to

promote sustainable research practices by stimulating, incentivising, and even requiring thoughtful academic travel.

An important initial step is to require a description of sustainable practices in funding applications, analogous to the way funders promote gender equality in research.⁶ Funders can require absolute reductions in the number of in-person meetings hosted or attended by grantees and insist on clear justifications from researchers for why meetings are organised in-person instead of virtually. Funders should set virtual meetings as the default for disseminating findings and international travel should be reserved for dedicated networking initiatives, career development, capacity building, and the international exchange of research staff. There should be increased financial support for virtual conferences and low-carbon modes of travel (eg, by train or coach).

In addition to stimulating sustainable research operations of grantees, funders should reduce the carbon footprint of their own practices. We examined travel-associated CO₂ equivalent (CO₂e) emissions of the EDCTP and ERC-Starting Grant (StG) panel meetings. We used publicly available data of EDCTP panel members for 2019 and assumed one panel meeting in The Hague and economy class travel. This involved 144 panel members from five continents who travelled a total of 1.2 million km, emitting an estimated 245 tons of CO₂e. For panel meetings of the ERC-StG, we also used publicly available data on host institutions of the 2019 panel members and laureates, assuming 2.5 times as many candidates attended interviews. We estimated distance travelled on the basis of the panel members' and laureates' European home institution; however, some people were based elsewhere at the time of interview and therefore this is probably an underestimation. For cities located within 500 km of the meeting venue, we assumed travel by train, which is probably also an underestimation. Panel members met twice in person and candidates were flown to Brussels for a brief 30-minute interview. Journeys for ERC-StG panel meetings greater than 5000 km were in business class, which have an associated 2-fold higher CO₂e emissions than economy class.⁵ With 376 panel members and an

This online publication has been corrected. The corrected version first appeared at [thelancet.com/planetary-health](https://www.thelancet.com/planetary-health) on January 11, 2022

For more on My Green Lab see <https://www.mygreenlab.org/>

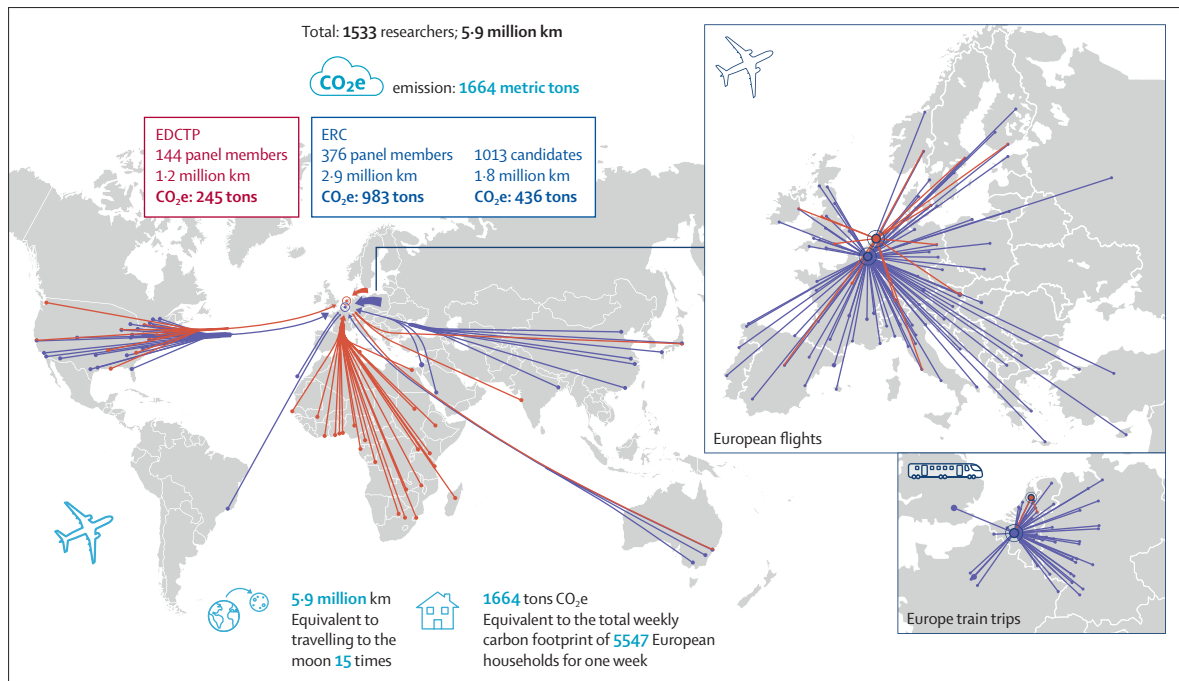


Figure: Travel associated with EDCTP and ERC-StG review meetings in 2019

Data on the city of origin from panel members and candidates were used to determine travel routes. Each line connects the city of departure with the meeting venues in The Hague, Netherlands (EDCTP) or Brussels, Belgium (ERC-StG). The thickness of the line reflects the number of journeys with, colours indicating funding schemes (red represents EDCTP and purple represents ERC-StG). The travel route is stylised; actual travel distance is based on available flights or train journeys. For all cities located within 500 km of the meeting venue, we assumed travel by train and CO₂e emissions of 22 g/km.⁵ For all other cities, we selected the flight option with fewest transfers using the Cheap Tickets online travel planner and calculated distances along a geodesic path using Great Circle Mapper. We then translated individual travel legs to CO₂e emissions using established methods⁴ that take the mean of three independent estimates and take into account direct emission of radiatively active substances (eg, CO₂), emission of chemical species that alter radiatively active substances, and emission of substances that trigger generation of aerosol particles or change natural clouds,⁵ resulting in estimated CO₂e emissions ranging from 0.5 kg/km for flight legs shorter than 350 km to 0.18 kg/km for long-haul flights. Business-class seating was taken into account by assuming 2-fold higher emissions than economy class.⁵ EDCTP=European & Developing Countries Clinical Trials Partnership. ERC-StG=European Research Council–Starting Grant.

For Cheap Tickets see <https://www.cheaptickets.nl/>

For Great Circle Mapper see <https://www.greatcirclemapper.net/>

estimated 1013 interviewed candidates, the ERC-StG funding process involved a total of 4.7 million km and 1419 tons of CO₂e emission. For both funding schemes, train travel was associated with 0.3 million (5.1%) of 5.9 million of all travel kilometres, but only 4 tons (0.2%) of the 1664 tons of total CO₂e emissions. The combined travel for these two funding schemes equals 15 one-way journeys to the moon⁷ and the total weekly carbon footprint of over 5500 European households (figure).⁸

Despite travel restrictions during the COVID-19 pandemic, scientific research continued and funding agencies kept operating. Virtual platforms were used for panel discussions and interviews, reducing the carbon footprint of these meetings by over 99.9%.⁹ Small changes can have positive impacts. By switching the 30-minute ERC-StG interview from in-person to virtual, the total carbon footprint of the funding selection process could be reduced by 31%. For essential in-person meetings, funders can maximise accessibility and value,

for instance by combining their funding panel meetings with scheduled conferences that are attended by panel members. Research funders are in a unique position to incentivise and enforce sustainable research practices that are in line with IPCC recommendations. Given the success of virtual meetings during the pandemic, reverting to old practices can only be interpreted as an active decision to ignore international climate action recommendations. We call for funders to act on the following: measure and publicly report on CO₂e emissions related to their own activities; commit to an absolute reduction in CO₂e emissions of these activities that is in line with the most up-to-date IPCC recommendations; embrace virtual platforms for panel reviews, funding interviews, and other meetings; and, for in-person meetings, require their staff to prioritise low-carbon forms of transportation such as trains. Funders can do this by joining the United Nations Climate Change (UNFCCC) Climate Neutral Now initiative.¹⁰ Additionally, we ask funders to include

sustainable practices as an eligibility and evaluation criterion in their funding applications; allow and incentivise expenses to support the shift to sustainable practices (eg, budget for virtual conferencing hardware and low-carbon forms of travel); require that grantees use virtual platforms as the default mode of interaction; and require that grantees have sustainable travel policies. Decarbonisation measures must be incentivised or enforced by funders if we are to substantially and rapidly decarbonise academia. Our actions today determine the severity of climate change tomorrow.

This analysis was not commissioned or endorsed by the European Research Council or the European and Developing Countries Clinical Trials Partnership. We acknowledge Olivier Berné (Institut de Recherche en Astrophysique et Planétologie, CNRS, CNES and Université de Toulouse, France) for feedback on the article, the support of Ezgi Taskopru, Benjamin Mordmüller, Matthew McCall, Joep Joosten, Wouter Graumans, Gijs Overheul, Nicholas Proelochs, Annie Yang, Roos de Jong, Rebecca Halbach, Alex van der Starre, Gwendolyn Thyen, Merel Smit, Kjerstin Lanke, Valerie Betting, and Ole Mulder (all Radboud University Medical Center, Nijmegen, The Netherlands) in retrieving publicly available European Research Council Starting Grant data. Martijn Gerretsen, David Burger, and Jonathan Briese (Radboud University Medical Center, Nijmegen, The Netherlands) helped with acquiring details on travel budgets in research grants; Michiel Akkermans assisted with the travel map. We declare no competing interests. KW is supported by a grant from the Bill & Melinda Gates Foundation (OPP1159477), the funder played no part in writing this paper.

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